



## Exercise Biochemistry Review

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### The Influence of Different Route Randomness on Energy Contributions of College Students' Badminton Running Practice with Change of Direction at Two Frequencies

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**Objective** Badminton four-corner running practice with change of direction commonly includes fix route and random route. However, the study of the energy contributions characteristics of these two training methods was very limited. The aim of this study was to investigate the influence of different route randomness on energy contributions of college students' badminton running practice with change of direction at two frequencies.

**Methods** 15 college badminton player whom from Shanghai University of Sport (Male, N=15, 22.9±1.4 yrs, 175.7±6.0 cm, 68.0±6.4kg, badminton training experience 2.2±0.5 yrs) volunteered to perform one test for maximal oxygen uptake ( $VO_{2max}$ ) on treadmill and four field tests with two route randomness (fix route and random route, F and R) and two frequencies (24 times per 1min and 24 times per 1min, H and L) of change of direction. A portable spirometric system (K4b<sup>2</sup>, Cosmed, Italy) was utilized to measure the ventilator information during the test, and capillary blood was taken from earlobe and analyzed prior and post the tests. The energy contributions was calculated with the method based on the fast component of oxygen debt ( $W_{Ala}$ ), accumulated blood lactate ( $W_{La}$ ) and  $VO_2$  ( $W_{Aer}$ ) during the tests.

**Results** Higher frequency significantly increased the energy contributions from the three pathways both with F and R ( $W_{Ala}$ : 26.2±6.3 kJ vs. 39.5±12.6 kJ,  $W_{La}$ : 5.7±2.4 kJ vs. 23.1±9.3 kJ,  $W_{Aer}$ : 27.1±6.5 kJ vs. 33.3±5.7 kJ,  $P<0.01$ ), and significantly increased the  $W_{La}$  (F: 23.9±8.1% vs. 9.6±3.4%,  $P<0.01$ ; R: 30.5±6.6% vs. 11.7±5.2%,  $P<0.01$ ), whereas significantly reduced the  $W_{Aer}\%$  (F: 35.2±6.5% vs. 46.0±8.5%,  $P<0.01$ ; R: 35.7±5.4% vs. 50.4±10.2%,  $P<0.01$ ). The R significantly reduced the  $W_{La}\%$  both in L (44.4±8.5% vs. 38.0±8.6%,  $P<0.05$ ) and H (40.9±10.5% vs. 33.8±8.6%,  $P<0.05$ ), significantly increased the  $W_{La}$  (23.1±9.3 kJ vs. 28.9±7.3 kJ,  $P<0.05$ ) and  $W_{La}\%$  (23.9±8.1% vs. 30.5±1.7%) in H.

**Conclusions** The route randomness of badminton running practice with change of direction at two frequencies has different effects on the energy contributions. The R will reduce the stimulation to the  $W_{Ala}$  and increase the stimulation to the  $W_{La}$ ; the H will increase the intensity of the running with change of direction as a whole, and will reducing the stimulation to the  $W_{Aer}$  and increasing the stimulation to the  $W_{La}$ . It is recommended that the coaches can change the stimulation of the  $W_{La}$  by changing the frequency of the change of direction and the randomness of the route when design the badminton four-corner running practice with change of direction.